

REMARKS:

Claim Rejections – 35 USC Section 103:

The Examiner has rejected claims 24-26 and 36-39 under 25 U.S.C. 103(a) as being unpatentable over US 5,635,835 to Mouchot et al. (Mouchot) in view of US 6,381,105 B1 to Huai et al. (Huai), US 6,341,053 B1 to Nakada et al. (Nakada) and US 6,590,803B2 to Saito et al. (Saito).

Claim 24 as amended recites a method for manufacturing dual spin valve having a bias structure formed between first and second spin valve structures. In order to further point out the distinctions between the invention as claimed in claim 24 and those taught in the prior references, the Applicant has amended claim 24 to recite that each of the spin valve structures has a free magnetic layer and that the bias structure has first and second ferromagnetic layers. The bias structure also has a de-coupling layer between each ferromagnetic layer and the respective free layer. Claim 24 as amended also recites that each decoupling layer is deposited to a thickness to magnetostatically couple the ferromagnetic layer with its respective free layer, and that each decoupling layer is sufficiently thick to avoid exchange coupling the ferromagnetic layer with the free layer. Support for this amendment to claim 24 can be found on page 23 line 18 – page 24 line 7.

None of the references alone or in combination teaches or suggests the method as recited in claim 24. For example, Mouchot teaches (for example in Figure 6) a dual spin valve having a pinned layer structure (14, 19) disposed between first and second free layers (15). The layer 16 of Mouchot is not of a thickness to magnetostatically couple the layer 13 with the layer 14. If it were, then the direction of magnetizations of the layers 13 and 14 would be antiparallel to one another rather than perpendicular to one another as shown. In addition, none of the other references Huai, Saito nor Nakada teaches a method for manufacturing a dual spin valve having a bias structure such as that claimed in claim 24.

The Examiners counterargument in response to the Applicants argument filed 2-16-06 states that the structure of Mouchot teaches a longitudinal bias layer because the

ABS could be considered to be to the right side of the substrate. The Applicant respectfully disagrees with this assertion. If this were the case, then the magnetization of the layers 13 and 15 would be oriented antiparallel to the magnetizations of the layers 14 (ie. into and out of the page rather than right to left and left to right). As indicated by the arrows in Fig. 6, the direction of magnetization of layers 13 and 15 are clearly perpendicular to those of the layers 14.

In addition, the Examiner asserts that the reference to Gill (US Patent 6,265,363) teaches a dual spin valve sensor having an in-stack bias structure such as that manufactured by the method of claim 24. In fact, upon careful examination of Gill, it can be seen that Gill does not teach any free layer biasing structure at all. Gill teaches an antiparallel coupled free layer structure (eg. layers 202 of Fig. 12) disposed between pinned layer structures (eg. 204, 206 of Fig. 12). Perhaps Gill presumes a standard hard bias structure (not shown) disposed to either side of the sensor 200, or perhaps the antiparallel coupling of the free layer 202 itself is assumed to be sufficient to bias the free layer.

The Examiner has also provisionally rejected claims 24-26 and 36-41 based on obviousness type double patenting, over Application No. 10/981,926, in view of 6,590,803, 6,381,105, and 5,635,835. The Applicant has submitted herewith a terminal disclaimer with regard to Application No. 10/981,926 to overcome this obviousness type double patenting rejection.

For the reasons set forth above, the Applicant sincerely believes that claim 24 as amended is allowable over the prior art. Claims 25-26 and 37 through 41 which depend from claim 24 are also, therefore, necessarily allowable over the prior art. In addition, claim 37 has been amended to recite that the decoupling layers each include a layer of Cu-O and a layer of Ru. Support for this amendment to claim 37 can be found on page 23 line 18 through page 24 line 7. None of the references alone or in combination teach such a method. For example, the Examiner points Huai et al, column 9 lines 20-30. Actually, Huai teaches that the spacer layer 74 can be Cu and the spacer 78 can be Ru. The spacer layer 74 of Huai is the electrically conductive spacer layer that is generally sandwiched between a free layer and a pinned layer in a spin valve. It is not equivalent

to a decoupling layer as recited in claim 24. Furthermore, what Huai refers to as a spacer layer 78, is what is commonly referred to as an antiparallel coupling layer (AP coupling layer) for maintaining antiparallel coupling between the first and second magnetic layers of a pinned layer structure (ie. 77 and 76). There is no teaching or suggestion that would lead one skilled in the art to conclude that a decoupling layer could be constructed using a layer of CuO and a layer of Ru.

The applicant sincerely believes that the present claims as amended are in condition for allowance. Therefore, a notice of allowance is respectfully requested. For payment of any fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account 50-1351 (Order No. HIT1P078A).

Respectfully submitted,

By: /Ronald B. Feece/

Ronald B. Feece
Reg. No. 46,327

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Zilka-Kotab, PC
P.O. Box 721120
San Jose, California 95172-1120
Telephone: (408) 971-2573
Facsimile: (408) 971-4660